

Similarly, the suppression of the branchiæ, the development of an amnion, and of a respiratory extra-abdominal allantois, and that enlargement of the basioccipital relatively to the exoccipitals which gives rise to a single skull-condyle, is all the change required to convert an Urodele amphibian into a Lizard. It is needless to recapitulate the evidence of the transition from the Reptilian to the Bird type, which the study of extinct animal-remains has brought to light.

The scheme of arrangement of the Vertebrata which naturally flows from the considerations now brought forward will stand thus:—

Stages of Evolution.	Representative Groups.		
9. <i>Eutheria</i> .....	<i>Monodelphia</i> .		
8. <i>Metatheria</i> .....	<i>Marsupialia</i> .		
7. <i>Prototheria</i> .....	<i>Monotremata</i> .		
6. <i>Hypotheria</i> .....	× .....	<i>Sauropsida</i> { <i>Aves</i> . <i>Reptilia</i> .	
5. <i>Amphibia</i> .....	<i>Amphibia</i> .....	×	
4. <i>Herpetichthyes</i> . <i>Dipnoi</i> .....	×	...	<i>Osteichthyes</i> { <i>Ganoidei</i> . <i>Teleostei</i> .
3. <i>Chondrichthyes</i> . <i>Chimæroidei</i> .....	×	...	×
	<i>Selachii</i> .	×	...
2. <i>Myzichthyes</i> ... <i>Marsipobranchii</i> ...	×	...	×
1. <i>Hypichthyes</i> ... <i>Pharyngobranchii</i> .	×	...	×

It appears to me that everything which is at present known respecting the Vertebrata of past epochs agrees with the assumption that the law which expresses the process of ancestral evolution of the higher Mammalia is of general application to all the Vertebrata. If this is admitted, I think it necessarily follows that the Vertebrata must have passed successively through the stages here indicated, and that the progress of discovery, while it will obliterate the lines of demarcation between these stages, and convert them into a continuous series of small differentiations, will yield no vertebrate form for which a place does not exist in the general scheme.

### NOTES

DR. JOHN STENHOUSE, F.R.S., died on December 31, in the seventy-second year of his age. He was a native of Glasgow, where he was educated and long resided. A pupil of Graham and of Liebig, he devoted all his time to research work in the domain of organic chemistry. He was a Royal Medallist of the Royal Society, LL.D. of Aberdeen, and one of the founders of the Chemical Society. On removing to London he was appointed Lecturer on Chemistry in St. Bartholomew's Hospital, London, but was obliged to resign in 1857, owing to a severe attack of paralysis. This however did not deter him from continuing his scientific studies, which were a labour of love to him. He was the inventor of the charcoal respirator, of the charcoal ventilator for sewers, and of a process for rendering fabrics water-proof by means of paraffin. In 1865 he succeeded Dr. Hofmann as non-resident assayer to the Royal Mint, but was deprived of the appointment when the office was abolished by Mr. Lowe in 1870.

ON the 3rd inst. Mr. John Thomas Towson died at his residence in Liverpool, in his seventy-seventh year. Mr. Towson was connected with the early history of photography, but in 1846 he devoted his thoughts to navigation, especially to determining the quickest routes across the ocean to distant countries. With this object he constructed a set of tables for facilitating the practice of great

circle sailing, and at the British Association in 1854 Mr. Towson aided Dr. Scoresby in directing the attention of the scientific section to the importance of investigating more fully the subject of the deviation of the compasses on board iron ships. The result of this discussion was the formation of the Liverpool Compass Committee. The observations and the deductions resulting from them were embodied in three reports, "presented to both Houses of Parliament by command of Her Majesty." In 1863 Mr. Towson was instructed by the Board of Trade to prepare a manual on the deviation of the compass, which was subsequently published at the expense of the Board, under the title of "Practical Information on the Deviation of the Compass; for the use of Masters and Mates of Iron Ships."

WE are glad to learn that Prof. MacOwan, late of Gill College, Somerset East, has accepted the post of Director of the Botanic Garden, Cape Town. He will also lecture at the South African College. The appointment of a man whose long and enthusiastic devotion to South African botany has earned him a wide reputation is to the credit of the Cape Government, and is of good omen for the scientific future of the Cape Botanic Garden. This has never yet attained the position which it would naturally derive from the resources of one of the most interesting floras in the world.

DR. W. FEDDERSEN of Leipzig is preparing a supplement to Poggenorff's well-known biographical dictionary. Many of our readers will receive during the next few days circulars asking them to answer a few questions as to their scientific life and labours. As the great utility of such a work lies in the completeness of the information it supplies, we trust that every one will fill up the answers to the questions as completely as is in his power, and that neither false modesty nor carelessness will create a gap in the work.

PROF. CORFIELD's lectures on Health to ladies will commence to-day, January 6, by an Introductory Lecture at 3 p.m., and will be continued on Tuesdays and Thursdays at the same hour. Ladies are admitted free to the Introductory Lecture.

HERR ROBERT OPPENHEIM of Berlin announces the forthcoming publication of a "Grundriss der Anatomie des Menschen," by Prof. Ad. Pansch of Kiel.

THE Reale Istituto Lombardo has awarded two sums of 1500 lire, on the Brambilla foundation, (1) to the Milanese Committee of Animal Vaccination for founding a vaccinogenic establishment in Milan; and (2) to S. Bassolini for establishing in Milan a manufactory of white-lead colours and varnishes. On the Fossati foundation a sum of 2000 lire has been awarded to Dr. Golgi for studies on the fine anatomy of central organs of the nervous system; and 1000 lire to Drs. Tenchini and Staurengi for researches in the anatomy of the cerebellum, the Pons Tarini, &c. A list of prizes now open to competition will be found in the *Rendiconti* of the Institute, vol. xiii. fasc. xviii. The subjects have nearly all been previously published. (We note that one is "Studies on the Telephone.") The prizes vary in value from 500 to 4000 lire. Foreigners may compete, and memoirs must be written in Italian, French, or Latin.

THE Transit of Venus Commission has already met at the French Academy of Sciences, as usual under the presidency of M. Dumas, but no resolution was come to. A number of scientific men have already offered themselves as observers.

BARON NORDENSKJÖLD arrived at St. Petersburg on Saturday, and was received at the station by the Swedish Ambassador and delegates from the Russian societies. In the course of the day he was received at the Foreign Office, and is to be *féted* by the Municipality and the learned societies.

THE dates for some of the papers which will be read at the Society of Arts before Easter next have been announced. The following are set down for the ordinary meetings (Wednesday evenings):—January 12: A Sanitary Protection Association for London, by W. Fleeming Jenkin, F.R.S. (On this evening Prof. Huxley will preside.) January 19: Causes of Success and Failure in Modern Gold-Mining, by A. G. Lock. February 23: Recent Advances in Electric Lighting, by W. H. Preece. March 2: Flashing Signals for Lighthouses, by Sir William Thomson, F.R.S. March 9: Improvements in the Treatment of Esparto for the Manufacture of Paper, by William Arnot, F.C.S. March 16: The Manufacture of Aërated Waters, by T. P. Bruce Warren. In the Indian Section (Friday evenings), the following will be read:—January 21: Forest Conservancy in India, by Sir Richard Temple, Bart., G.C.S.I. February 11: The Gold-Fields of India, by Hyde Clarke. March 4: The Results of British Rule in India, by J. M. Maclean. March 25: The Tenure and Cultivation of Land in India, by Sir George Campbell, K.C.S.I., M.P. The dates and Papers for the Foreign and Colonial Section (Tuesday evenings) will be:—February 1: The Industrial Products of South Africa, by the Right Hon. Sir Henry Bartle Edward Frere, Bart., G.C.B., &c. February 22: The Languages of South Africa, by Robert Cust. March 15: The Loo Choo Islands, by Consul John A. Gubbins. April 5: Trade Relations between Great Britain and her Dependencies, by William Westgarth. For the Applied Chemistry and Physics Section (Thursday evenings) the arrangements are as follows:—January 27: A New Mechanical Furnace, and a Continuous System of Manufacturing Sulphate of Soda, by James Mactear. February 24: Deep-Sea Investigation, and the Apparatus used in it, by J. G. Buchanan, F.R.S.E., F.C.S. March 24: The Future Development of Electrical Appliances, by Prof. John Perry.

VARIOUS earthquake shocks in Roumania, Transylvania, Hungary, &c., in the latter days of December, are reported; in Bucharest, on the 23rd of that month at 11.20 a.m., and on the 25th at 5.45 p.m.; in Tultscha also, on the 25th, at 5.25 p.m. (direction north-west to south-east); in Fokschau, at 5.5 p.m., pretty strong, duration 8 sec.; in Tecuciu at 4.51 p.m., two strong shocks, the first lasting 2 sec.; the second 4 sec.; in Washui (near Tassy), a very violent undulatory shock; in Silistria (Bulgaria), at 3.22 p.m., 20 shocks lasting 1m. 20s.; in Homorod (Hungary), at 4.18 p.m., duration 5s., direction west to east; in Földvár (Hungary), at 4.20 p.m., direction north-west to south-east. At the same time shocks were felt at various places in the south-east of Transylvania.

IT may be useful to some of our readers to know that the Library of the Society of Telegraph Engineers and of Electricians is open to members of all scientific bodies, and (on application to the librarian) to the public generally. The library is open daily between the hours of 11.0 a.m. and 8.0 p.m., except on Thursdays and on Saturdays, when it closes at 2.0 p.m.

"WHITAKER'S ALMANAC" is undoubtedly a most useful publication; but in the larger edition there is a supplement of miscellaneous information which seems to us to require looking after. Among other things there is a variety of items more or less connected with science. There is a "Scientific Summary" consisting of nine lines of introduction (in which the only geological fact mentioned is the discovery of some fossil remains in Essex), followed by selected subjects of general interest, including such items as "Steam Power in Germany," "Forests in Russia," "The World's Gold and Silver," "American Railroad Progress," all looking like so many random newspaper cuttings; but no mention of perhaps the most brilliant scientific event of the year—Mr. Graham Bell's "Photophone." In another part of the

supplement we have two pages on the "Progress of Astronomical Science"; why this is not included in the "Scientific Summary" the editor perhaps knows. A page is devoted to "Radiant Points of Shooting Stars," two to the "Year's Weather," three to "Earthquakes and Volcanic Eruptions," and three to "Geographical Discovery." The writer of the last-mentioned actually places Mr. Leigh Smith's yacht voyage to Franz Josef Land as "the most remarkable geographical event" of a year which witnessed the successful conclusion of Mr. Joseph Thomson's remarkable African Expedition, because he thinks it opens up "a new and apparently feasible route for future Polar research: does he not mean *search*? Evidently the supplement to this "Almanac" stands in need of editing, and as the whole work is to be reset for next year, perhaps this part will be brought up to the level of the rest of the work.

THE *Annuaire* of the Bureau des Longitudes for 1881 has been issued by Gauthier-Villars. As usual, it is full of information on a great variety of subjects more or less connected with science.

*Land and Water* states that the late Mr. Frank Buckland has bequeathed his valuable Museum of Economic Fish Culture to the nation; and on the decease of Mrs. Buckland a sum of 5000*l.* will revert to the nation, to be applied for the purpose of founding a professorship of economic pisciculture in connection with the Buckland Museum and the Science and Art Department at South Kensington.

A SCOTCH Fisheries Improvement Association has been formed for the purpose of making an effort to improve by various means the fisheries of the Scotch rivers, which have in recent years considerably deteriorated. The president is the Duke of Sutherland, and the chairman of the provisional committee Mr. David Milne Home.

WE have received a copy of the regulations issued by the French Minister of Posts and Telegraphs for the International Congress and Exhibition of Electricity, to be opened at Paris next September. Those interested in the Congress should apply to M. le Commissaire Général de l'Exposition Internationale d'Electricité, at the Palace of the Champs Élysées, porte No. IV., Paris.

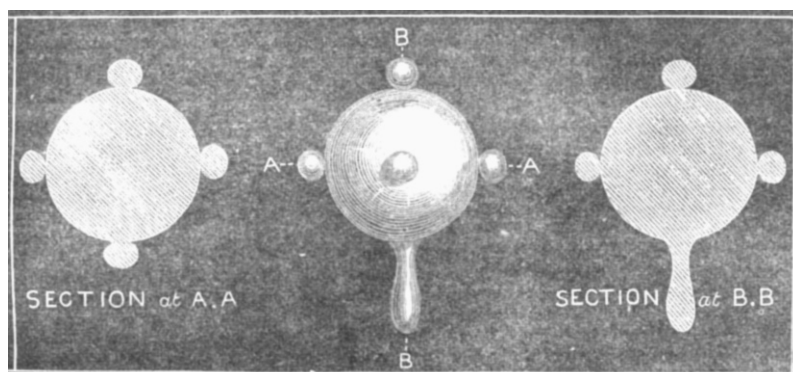
MR. INNES ROGERS, in a letter to us, calls attention to a list of bamboos published in vol. i. of the *Garden*, which are found to be hardy under cultivation, and to the fact that several kinds, chiefly from China and Japan, grow in Battersea Park, Kew Gardens, &c. He further instances as hardy plants a Cactus from the Rocky Mountains, Begonia from the Andes, the well-known *Chamarops excelsa*, *Ficus repens*, and a Mesembryanthemum acclimatised at Scilly, and believes that the fixity of continents through long geological periods would cause tropical species in spreading to adapt themselves to temperate conditions. He thinks that the Gulf Stream may have brought tropical seeds to Bournemouth, and that a most trifling change of climate would have made them thrive there.

A NEW illustrated archaeological review will soon be published at Naples by MM. Augusto Mele and Enrico Abeniaco. It will be in French, and its title will be "Pompeii." The object of the new publication is to excite in wider circles a vivid interest for the excavations at Pompeii, Herculaneum, &c., as well as for archaeology generally.

IN the Austrian "Engineers and Architects Union" at Vienna, a new aeronautical department has been created, with the object of discussing and solving aeronautical problems and questions both theoretically and in practice, as well as making the necessary experiments. The application of aeronautics to meteorological science forms a special study of the department.

To the October number of *Symons's Monthly Meteorological Magazine* Col. Foster Ward writes describing some remarkable hailstones that fell during a slight thunderstorm at Partenkirchen, Bavaria, at 6 p.m. on August 21. He was on a mountain about 3000 feet above the village, and saw the cloud (a small one) pass

over the valley below. There were several peals of thunder, but there was no visible lightning, owing, he concludes, to the sun's brightness. "On arriving near home, I met a friend who told me it had been hailing 'tadpoles' and 'acidulated drops.' There had been little or no rain and no visible lightning, and



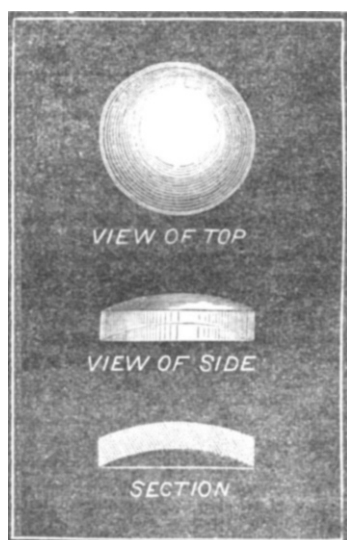
the hailstones fell at intervals and about six feet apart. There were very few of them, my family only picking up twenty in a space occupied by a full-sized lawn tennis court. My son made a sketch of their shape and size, which I inclose. The greater part were of the 'tadpole' shape and were clear as glass, perfectly round, the five knobs being at equal distance from one another. The flat stones had more or less a slight nucleus of snow in the convex portion of the stone. My wife and three daughters, and two ladies staying with us, say that the stones looked just like a lady's hand looking-glass, with a knob at the top and on either

THE total completion of the St. Gothard tunnel will very likely take place in July of this year; the railway is to be opened on July 1, 1882. The mail-bags are even now carried through the tunnel by messengers when rough weather prevails upon the mountain. On December 21 the first mail-bag was so carried through the tunnel, and it took four hours to convey it from Erschenen to Airolo.

#### GEOGRAPHICAL NOTES

At the Second International Polar Conference at Berne all the leading nations of Europe were represented except England. The leading stations have been definitely decided on. Austria undertakes to establish a station in northern Novaya Zemlya, at the expense of Count Wilczek; Denmark has selected Upernivik; Germany New Georgia for the Antarctic, and Jan Mayen or East Greenland for the Arctic regions; Norway, Bossekop in Finmark; Holland the south-east coast of Novaya Zemlya, or the coast of Siberia, between the mouth of the Yenissei and Cape Taimyr; Russia has selected two stations, the mouth of the Lena and the New Siberian Islands. Even Switzerland, which has not even a sea-board, hopes to take part in the international movement, by establishing a station at Mossel Bay, in Spitzbergen. The expedition to be sent out by Italy to the Antarctic region under Lieut. Bove is to some extent connected with this scheme, and no doubt France will ultimately be compelled to take her part. As to England, there has hitherto been no sign that as a nation she is even interested in a scheme so full of important issues for science and navigation.

IN a recent paper to the R. Accademia dei Lincei, Signor Guido Cora, a member of the International Polar Committee, urges the importance of the enterprise under consideration, and of Italy sharing in it. He considers the Antarctic zone as the more suitable one for Italy, as being nearer regions where Italians form a large portion of the population and conduct an extensive commerce; moreover the south has a brilliant record of geographical exploration by Italians in the sixteenth century, and the recent project of an Antarctic exploring expedition has drawn enthusiastic attention. For the temporary scientific observatory which the Italian Government is recommended to plant in 1882 (in harmony with the large scheme), S. Cora suggests one or other of three places:—1. Port Spence, on the east coast of Coronation Island in the Southern Orkneys, at about 60° 50' S. lat., and 45° 45' W. long. 2. Cape Look-out, on the south coast of Elephant Island, in the north-east part of the Southern Shetland group, at about 61° 17' S. lat. and 55° 15' W. long. (a station at either place would serve well as a base of operations for the Italian Exploring Expedition). 3. In the case of means being inadequate for a station at either of the two places named, S. Guido recommends some one of the islands close to Cape Horn. Supposing that the transport would be by a Government vessel destined to the naval station



side for ornament. More than twenty, perhaps thirty, were picked up of this shape. Of these about two-thirds were studded, the rest plain, with only the tail or handle, the thinnest part of it being near the body of the stone, as in sketch. The studs were all symmetrically placed. There were from three to five in each stone besides the handle. When there were less than five they occupied the same positions as if the five had been complete. In some cases the handle appeared to have been knocked off. The drops were more numerous, were all of same shape, convex at the top, the bottom being concave (like a small china painting palette)."